



**KPPC**

Kentucky's Resource Center for  
Environmental Sustainability

KPPC - Kentucky Pollution Prevention Center

# Energy Efficiency & Pollution Prevention Opportunities

April 2016

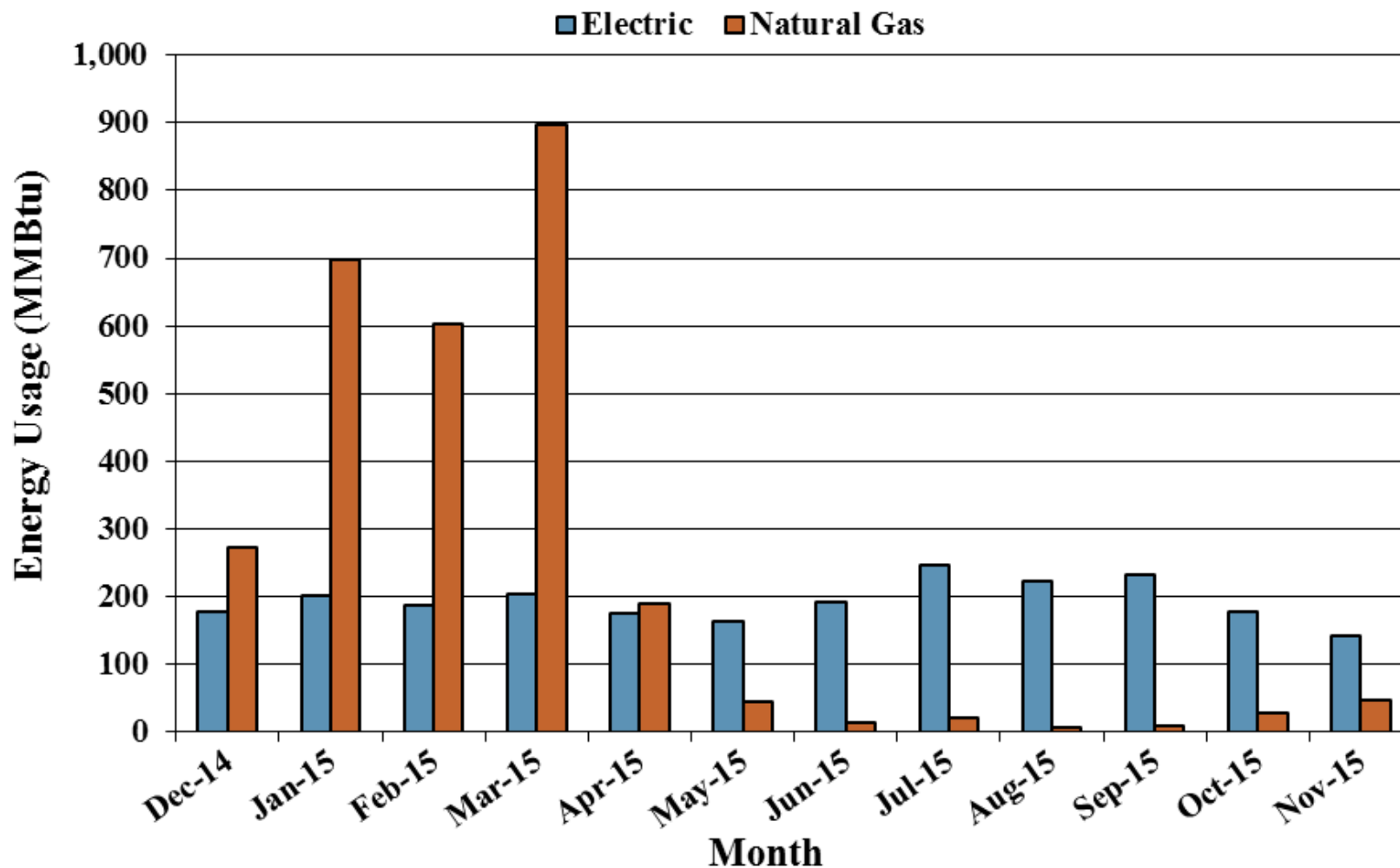
**Cheryl Eakle, CEM**

*Sr. Sustainability Engineer*

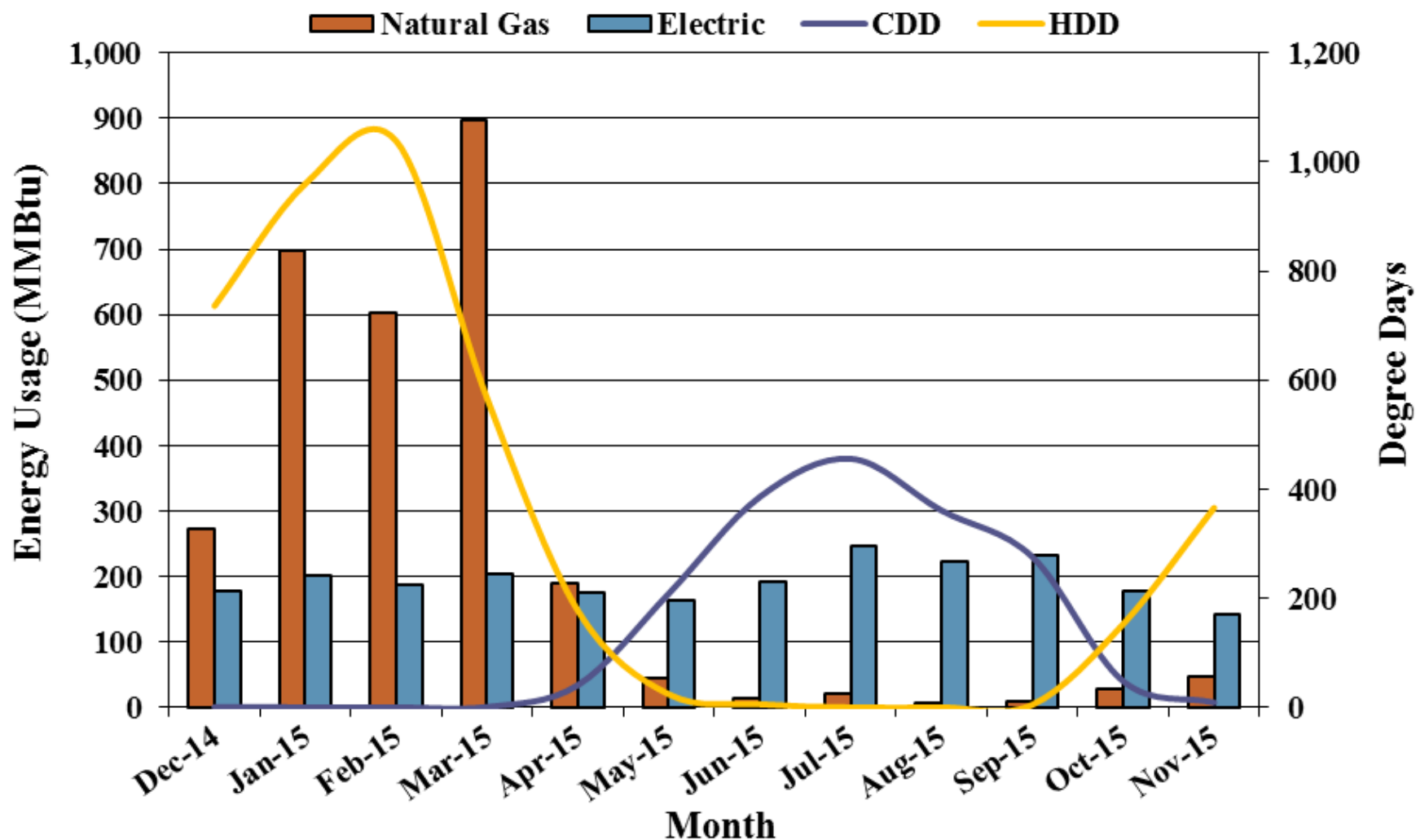
# Why You Should Understand Your Energy Bills

- **Who pays the bills?**
- **Can't manage it if you don't measure it!**
- Develop an energy management program
  - Establish a baseline
  - Up-to-date records of cost and **use**
  - A separate record for each type of energy

# Annual Energy Use



# Energy Use vs Climate



# Energy Units – Natural Gas

Natural gas sold by volume

100 cubic feet (ccf)

1,000 cubic feet (Mcf)

or heat content

1 million BTU (MMBtu)

# Energy Units – Electric Service

- **kW** = unit used to measure electrical demand (power)
- **kWh** = unit used to measure electrical energy (use)

**1 kWh = 1,000 Watts** of power used for 1 hour



# Energy Units – Electricity Analogy

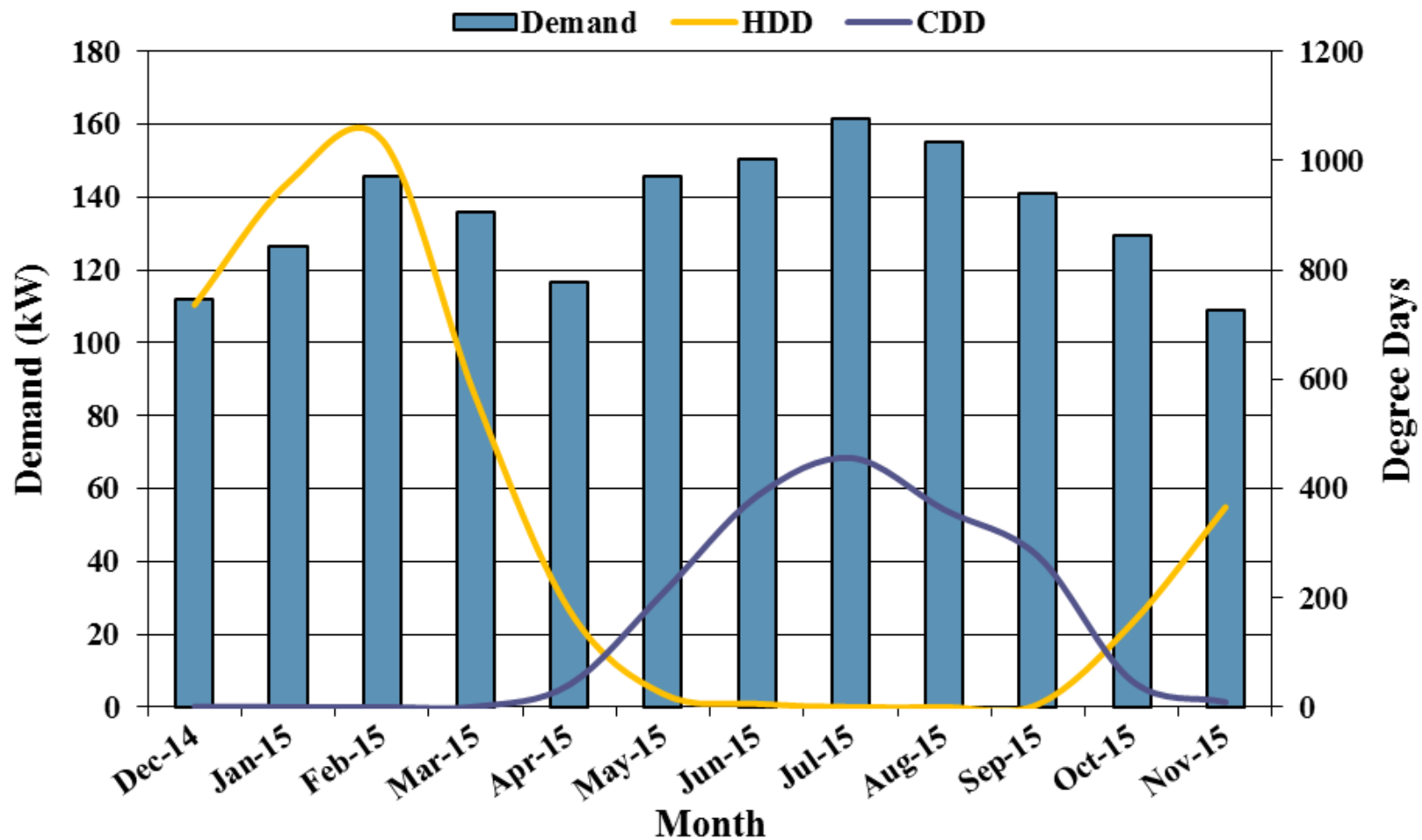
**Electrical Charges typically have two metered components:**

**Demand (Power)**

**Consumption  
(Energy)**



# Demand vs Climate





# Effective Cost

$$\text{Effective Electric Cost} = \frac{\text{Total Electric Bill}(\$)}{\text{Total Use (kWh)}}$$

$$\text{Effective Gas Cost} = \frac{\text{Total Natural Gas Bill}(\$)}{\text{Total Gas Used (ccf)}}$$

OR

$$= \frac{\text{Total Natural Gas Bill}(\$)}{\text{Total Gas Used (MMBtu)}}$$

# Implement an Energy Management Program (EMP)

- Institute an energy policy:
  - Commit to environmentally responsible goals
  - State how those goals will be reached
- Form and Empower an Energy Team

# Energy Team Representation

- Administration/Management
- Coaching Staff
- Students
  - Athletes
  - Others?
- Maintenance/Facility
- Accounting

# Plug Load Management

- Inventory all facility plug loads being left on
  - PC power settings/security patch management
  - Vending machine power control
  - Standby power
    - Use of power strips
    - Unplug if not using
    - Office equipment
    - ENERGY STAR rated
  - Seasonal shutdown
  - Refrigerators
  - Kitchen equipment
  - Water heaters



# HVAC Opportunities

- Use temperature setbacks
- Adopt a Preventative Maintenance Plan
  - Filter changing
  - Fan belt replacements
  - Coil cleaning
  - AC condensation drip pans
  - Duct leak prevention

# Lighting Opportunities—Occupancy Sensors

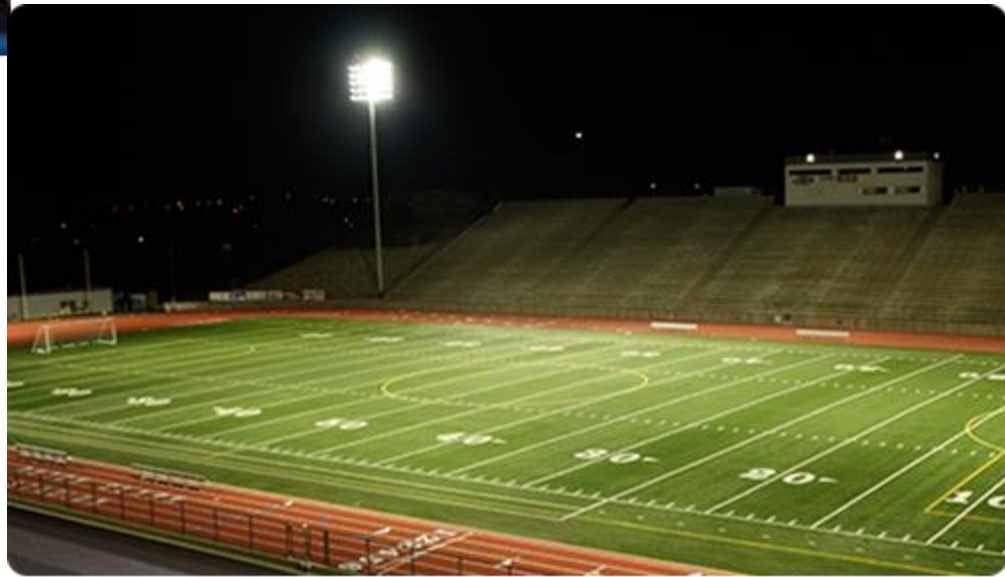


Type of Room	Energy Savings
Private Office	13-50%
Open-plan Office	20-28%
Classroom	40-46%
Conference Room	22-65%
Restroom	30-90%
Corridors	30-80%
Storage Area	45-80%

US DOE



# Lighting Opportunities – Upgrade to LED



Courtesy of Qualite Sports Lighting

# Field Lighting - Metal Halide vs LED

	Metal Halide	LED
Fixtures	120	104
Fixture Power	1500 Watt	1000 Watt
Total Power	195 kW	104 kW
Hours per Event	4*	3**
Cost @ \$0.80/kWh	\$62.40	\$20.80
10 Events/Year	\$624	\$208

\*Includes 1 hour warm up + 1 hour post game

\*\*Includes 1 hour post game @50% power



# Gym Lighting – Metal Halide vs LED

	Metal Halide	LED
Fixtures	30	30
Fixture Power	250 Watt	110 Watt
Total Power	7.5 kW	3.3 kW
Daily Use (hrs/yr) + 20 Games	1,360	1,340
Energy/year (kWh)	10,200	4,389
Annual Cost @ \$0.80/kWh	\$816	\$351

# Other Lighting Opportunities

Replace incandescent lighting with CFLs or LEDs



Replace or convert exit signs to LED

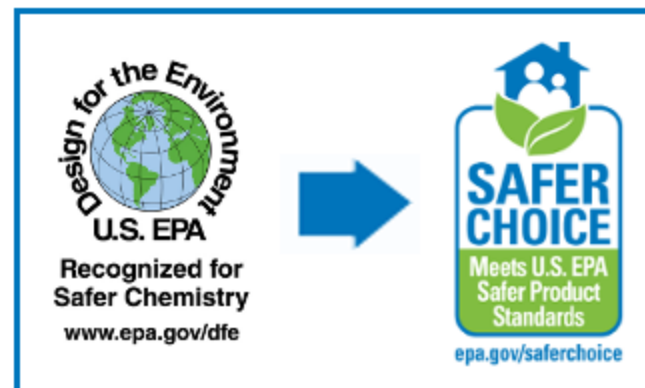


# Concession Opportunities



## Recycle Receptacles

## Cleaning Supplies







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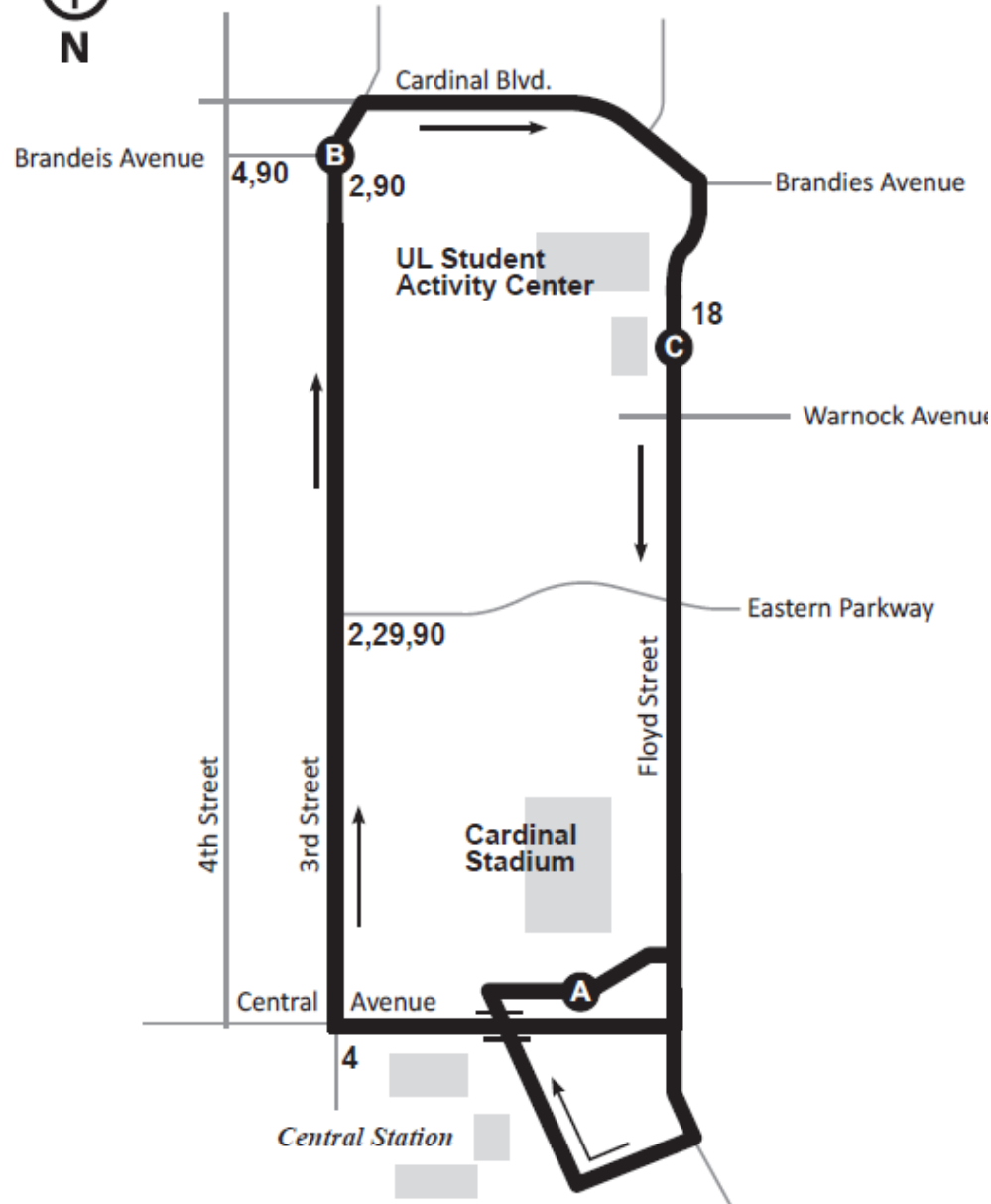
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# 94 Cardinal Shuttle

Follow us on:



Google maps





**Hydration Station** - *fruit + water, that's it! All natural.*

**Simple Servings** - *an allergen-free station, prepared with no milk, eggs, wheat, soy, shellfish, peanuts, tree nuts or gluten*

**Bella Trattoria** - *pasta and pizza*

**Flying Star Diner** - *comfort food and grill*

**Magellan's** - *world cuisine prepared on display - ask for a custom stir fry!*

**Basic Kneads** - *deli and soup*

**Wild Mushroom** - *\* vegetarian and vegan - ask for a custom stir fry!*

**Just Desserts!** - *Home-made baked goods, frozen yogurt, ice cream, and smoothies!*

**Baked Potato Bar** - *Idaho and sweet potatoes*

**Salad Bar** - *features local in-season produce*

**Also:** - *cereals, large selection of beverages and more!*

*\*This station may sometimes be staffed by a nearby station. If you do not see anyone, please check next door and they'll be glad to help!*